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Re: Center for Biological Diversity and John Muir Project Petition to List the Black-Backed Woodpecker

Dear California Department of Fish and Game and California Fish and Game Commission,

As a professional ecologist, expert on the Black-backed Woodpecker, and petitioner, I am writing to respond to several clear errors and significant inaccuracies in the February 15, 2011 memo from the Department of Fish and Game (DFG) finding that listing of the Black-backed Woodpecker ("BBWO") under the California Endangered Species Act does not meet the "may be warranted" standard. Full citations for scientific sources or studies are already included in the Petition and, therefore, are not included again in this memo, unless otherwise noted. I offer the following in the hope of facilitating greater scientific accuracy and integrity in the assessment of threats to the California population of the Black-backed Woodpecker, and would be happy to discuss any of the following with the Department.

Genetic Distinctiveness of the California Population

The DFG Report (p. 9) asserts that page 17 of the Petition "erroneously claims that the BBWO population in California is known to be genetically distinct based on Pierson et al. (2010)" and, similarly, on page 13, the DFG Report states that the "Department disagrees with the Petition statement that the California population of BBWOs may be disjunct from 'the continuous boreal forest population,'" again citing page 17 of the Petition. The DFG Report (p. 13) also incorrectly asserts that the Petition relied "on range maps from two popular bird field guides" for the Petition's assessment of genetic distinctiveness.

The DFG's statements represent a clear error here. As stated in the Petition, Pierson et al. (2010, p. 11) found that the Oregon/California population was genetically distinct from the boreal population at a level consistent with different subspecies. Pierson et al. (2010) referred to the Oregon/California population as the "Oregon" population (Fig. 1 of Pierson et al. 2010) since the birds that were sampled were from the eastern Cascades region in southern Oregon. Though no birds were sampled in California, Pierson et al. (2010) concluded that the Oregon/California population was genetically distinct from the boreal population due to the fact that there is no

habitat connection to the boreal population from California, and the closest connection to the boreal forests from the Oregon/California population is through the eastern Oregon Cascades (see Fig. 1 of Pierson et al. 2010). Pierson et al. (2010) concluded: “When we included Oregon with the boreal forest group, the variation among sites increased 15-fold, confirming a barrier likely exists between Oregon and the boreal forest.” There is no remotely credible scientific basis for DFG to assume that the California portion of the Oregon/California population is not genetically distinct from the boreal population when it is the southernmost portion of the Oregon/California population, and it is much farther away from the boreal population than the eastern Oregon Cascades birds, which were found to be genetically distinct from the boreal population due to habitat gaps in eastern Oregon and in the Columbia River gorge. The habitat gaps between the California population itself and the boreal population are orders of magnitude larger than those separating the eastern Oregon Cascades from the boreal population (Pierson et al. 2010, Fig. 1). Unless there is a basis to assume that BBWOs regularly disperse hundreds of miles across the high deserts of the Great Basin to reach the closest boreal populations in the forests of Idaho—and, of course, there is no basis for any such assumption—then the only reasonable conclusion that can be drawn from the fact that the eastern Oregon Cascades birds are distinct from the boreal population is that the California birds are distinct from the boreal population as well. The only thing that is not currently known is whether the California population is distinct not only from the boreal population, but also from the Oregon population, due to some possible habitat gaps near the California/Oregon border. The Petition (p. 17) states only that this is a possibility, but does not assert that it is known to be the case, as the DFG Report (p. 13) incorrectly implies.

Specialization of Foraging Ecology and Diet

After reviewing dozens of scientific studies in the United States, cited in the Petition, which conclude that the Black-backed Woodpecker is highly specialized to forage in areas of complete or near-complete recent tree mortality in dense forest dominated by larger trees (see, e.g., Petition, pages 15-16, 24-26, 29-36, 46-48), the DFG Report (p. 11) states that the “Department did not find evidence of the Petition’s claim that BBWO is ‘highly specialized in its foraging ecology and diet.’” The DFG Report (p. 11) goes on to cite Murphy and Lehnhausen (1998) to support this assertion, claiming that this study found no meaningful difference in foraging ecology between BBWOs and Three-toed Woodpeckers or Hairy Woodpeckers. First, whether or not there is a meaningful difference between these three species is not germane to the question of whether the BBWO is highly specialized, as the other two species could potentially be highly specialized in the same way. In fact, however, the Murphy and Lehnhausen (1998) study directly and emphatically contradicts the DFG Report’s characterization, finding that 95% of the BBWO’s diet consisted of wood-boring beetle larvae, while wood-boring beetle larvae comprised only two-thirds of the Hairy Woodpecker’s diet, and only 32% of the diet of the Three-toed Woodpecker (see Table 3 of Murphy and Lehnhausen 1998). Murphy and Lehnhausen (1998) concluded that “the black-backed woodpecker may be *highly specialized in its foraging ecology and diet*” (emphasis added). Hutto (2008) found the BBWO to be an “extreme habitat specialist,” nearly restricted to beetle larvae (mostly wood-boring beetles) in areas of very high snag density in recent intensely-burned forest (see also Hutto 1995 and Hutto

2006). Clearly, DFG's assertion that it "did not find evidence" of specialized foraging ecology is incorrect, as such evidence was in abundance in the Petition.

Importance of Mature and Old Growth Trees/Forest

The DFG Report (pp. 13-14) claims that the "Petition concludes that BBWO may rely on old growth conifer forests," both burned and unburned, and asserts that "the claim that BBWO rely on old growth forest is unsupported." However, the Petition never claimed that BBWOs rely exclusively on "old growth" forests. The Petition states that BBWOs rely upon *mature and old-growth forest*, or "old forest"—a much broader category of forest structure than DFG incorrectly attributed to the Petition's conclusions. For example, the Petition (p. 25) states that BBWOs in one California study "were found foraging only in dense mature/old-growth forest that burned at high intensity (Hanson and North 2008)." Elsewhere, the Petition makes similar references to "mature and old-growth" (p. 29), "old forest" as opposed to "young forest" (p. 24), and dense "old" forest (p. 23). Moreover, the DFG Report (p. 14) suggests that forests older than 80 years are not "mature," contrary to accepted definitions of the term. In the Petition, "mature" is used to describe stands in the BBWO's California range generally at least 80 years old, consistent with the scientific literature cited in the Petition.

Published studies corroborate the Petition's assertion that, in the rare instances in which BBWOs inhabit unburned forests, this species prefers mature and older coniferous stands (Settingington et al. 2000, Hoyt and Hannon 2002). Goggans et al. (1989) found that radio-marked black-backed woodpeckers in unburned beetle-killed lodgepole pine forests in Oregon selected mature and older stands for foraging and avoided younger stands. Thus, the published data show that, where BBWOs do occur in unburned forests, the species prefers to occupy and forage in older coniferous stands.

Similarly, the DFG Report (p. 23) claims that "available data do not indicate a strong link between BBWO and large trees or old forests." This statement does not make sense in light of two things. First, elsewhere the DFG Report itself (p. 14) concludes that "[e]vidence exists to support the conclusion that BBWO select forest stands with *larger trees*." (emphasis added), and adds (DFG Report, p. 15) that BBWO forage on large snags "more than expected based on availability, which is likely explained by the fact that their primary food, wood-boring insect larvae, are found in greater numbers in larger diameter snags." Second, as discussed above, the Petition cites numerous scientific studies in the United States showing that BBWOs preferentially select *dense stands of larger trees* that have recently burned at higher fire intensities (Petition, pp. 23, 25-26), and preferentially select large and very large snags for foraging (Petition, p. 26, citing Hanson 2007). The DFG Report's (p. 23) citation to the Dudley and Saab (1998) study for the proposition that BBWOs "selected the smallest average diameter nest trees" is highly misleading. Dudley and Saab (1998) found that BBWOs selected nest trees that were significantly larger than average, based upon availability—in other words, they selected *larger trees* for nesting. They simply did not select nest trees as large as some other woodpecker species (Dudley and Saab 1998). Moreover, as discussed in great detail in the Petition (pp. 23, 25-26), the scientific literature is clear that BBWOs preferentially select snags that are much larger than average, based upon availability, for *foraging*—an essential part of

their life history (Hutto 1995, Hanson 2007, Russell et al. 2007). There is no disagreement about this in the scientific data.

Unburned Forest

The DFG Report (pp. 15-17) inaccurately claims that “the Petition provides little information on the use of unburned forests by BBWO” and “may substantially underestimate the importance of unburned forest as habitat for the species, and to statewide population levels.” The DFG Report’s assertions on this issue are demonstrably inaccurate, often to a dramatic degree, for several reasons.

First, the Petition (pp. 20-21, 31-32, 43-44) cites several extensive scientific studies, based upon large data sets, showing that BBWOs use unburned forest at a tiny fraction of the levels found in burned forest, including Hutto (1995), Smucker et al. (2005), Hutto (2008), and Hanson and North (2008), which was conducted in the Sierra Nevada. Hanson and North (2008), excluding edges between burned and unburned areas to avoid confounded effects of close proximity to fire, found BBWOs only in the high-severity-burned/unlogged forest and none in unburned forest. Smucker et al. (2005), similarly, only found BBWOs in burned forest and found none in unburned areas. In Hutto (2008), one of the largest data sets ever gathered for any wildlife species in ecological history, “[o]nly six of 194 woodpecker detections occurred in something other than a burned forest.” The 188 detections in burned forest were out of 3,218 sample points, i.e., BBWO present at 6.0% of burned points, while the 6 detections in unburned forest were out of a total of 13,337 points, i.e., BBWO present at only 0.045% of unburned points. In other words, in the most comprehensive data base, Hutto (2008) found BBWO abundance in unburned forest to be 1/133th of their abundance in burned forest. In Appendix F to the Petition, I presented results from another large data set, gathered recently by the U.S. Forest Service in the Sierra Nevada and published online, showing that BBWO abundance in unburned forest in the Sierra Nevada is 1/83rd of their abundance in burned forest. The DFG Report (p. 16) attempts to sidestep these clear findings by erroneously claiming (p. 16) that this data is based upon “a small sample size,” and further erroneously claiming (p. 16) that “the Petition makes an assumption unsupported by data in equating the probability of detecting individuals in burned and green forest to nesting densities in burned and green forests.” The DFG is implying here, without any scientific basis whatsoever, that BBWOs are abundant in “green forests” (i.e., forests that do not have high mortality from fire or beetles) despite the fact that study after study finds them to be absent or nearly absent in green forests—i.e., DFG is positing a sort of “phantom” bird notion for green forests, suggesting that there are somehow large and healthy populations of Black-backed Woodpeckers nesting in green forests that inexplicably cannot be detected through any method known to science (as discussed below, forests with high mortality from beetles are actually extremely rare in the BBWO’s range in California). This is flatly contradicted by the scientific data clearly presented in the Petition, since Hutto (2008) conducted point counts in burned and unburned forest, as well as “playback” recordings (of BBWO calls) in unburned and burned forest, and found the same thing—a dramatically skewed abundance in burned forest and absence or near-absence in unburned forest. The playback method has an extremely high rate of detection regardless of habitat type or cover, since it actively calls the bird and draws it right to the observer (Hutto 2008, Siegel et al. 2010); in other words, if the birds are present in unburned

forest, the playback method detects them consistently. Hutto (2008) concluded that the BBWO is an “extreme habitat specialist” due to its nearly exclusive relationship with burned forests. As discussed immediately above, the data presented in the Petition shows that BBWOs are about 100 times more abundant in burned forests than in unburned forests, for a given area of equal size. Moreover, a recent study on precisely this issue—BBWO nest densities in burned versus unburned forests—used the playback method to detect BBWOs along 200-meter-wide transects, and then spent up to 90 minutes following the detected birds throughout the forested landscape (not just in the transects) to locate nests (Russell et al. 2009). The study found 21 BBWO nests in burned forest and zero in unburned forest dominated by lodgepole pine and white fir at 1500-2000 meters in elevation in the Fremont-Winema National Forest, and on a Nature Conservancy preserve, just north of the California/Oregon border (Russell et al. 2009). Since Russell et al. (2009) was not cited in the Petition, the full citation for this study is included below, and the study is attached to this letter.

Second, the DFG Report (pp. 15-16) cites three studies finding some presence of BBWO in beetle-killed/unburned forest in other states, Bull et al. (1986), Goggans et al. (1989), and Bonnot et al. (2008), and then mentions that Christensen et al. (2008 [Appendix 2, Table 40]) found 121,000 acres of unburned forest with >25% mortality from beetles “in California.” However, the DFG Report neglected to mention that the figures in Christensen et al. (2008) pertained to the extent of “damage” (e.g., dead tops, some dead branches, or relatively low vigor) to *live* trees, not to the level of tree mortality, and much of this area was in the coast range or southern California—well outside of the BBWO’s range. See pp. 55-56, and Table 42 of App. 2, in Christensen et al. (2008) (though Christensen et al. 2008 was cited in the Petition, only the first part of this study, pertaining to actual tree mortality levels, was included with the Petition, so we include the other two portions, including the appendices, with this letter). Moreover, as mentioned in the Petition, Christensen et al. (2008 [p. 40]) found that the densities of larger snags (i.e., actual mortality levels) in California’s forests were extremely low—less than two per acre—and expressed concern about viability of some wildlife species with such low snag levels. For this reason, the DFG Report’s (p. 16) assertion that there are “159 BBWO nests in bark beetle infested conifer stands in CA” is based upon a misrepresentation of Christensen et al. (2008) regarding levels of beetle mortality (actual dead trees, or “snags”) in California’s forests, as well as a misrepresentation of the cited Bonnot et al. (2008) study used by DFG to derive this estimate. In Bonnot et al. (2008), most or all of the trees had been killed by bark beetles over large areas of the forested landscape, with “200-490 trees killed per hectare” (about 81-198 dead trees per acre). Similarly, in Bull et al. (1986) and Goggans et al. (1989), cited on page 15 of the DFG Report, the area in question (both studies pertained to the same area in northeastern Oregon) had approximately 50% mortality (see page 2 of Goggans et al. 1989) of the approximately 500 trees per acre (see page 33 of Goggans et al. 1989), for a total of about 250 recently beetle-killed trees per acre. Moreover, as discussed above, thousands and thousands of point counts have recently been conducted in unburned forests in the Sierra Nevada, and only a tiny number of BBWOs have been detected. If there were large tracts of beetle-killed forests in the Sierra Nevada occupied by BBWOs, the Forest Service’s massive survey effort would have detected them.

Third, the DFG Report’s (pp. 15-16) descriptions of the Bull et al. (1986) and Goggans et al. (1989) studies in unburned forests are also highly misleading and inaccurate. The DFG Report

(p. 15) states that Bull et al. (1986) found that 40% of BBWO nests were in live trees, but neglected to state that the majority of all trees were beetle-killed in the stands surrounding these nest sites (see Table 2 of Bull et al. 1986). Similarly, the DFG Report (pp. 15-16) claims that, in Goggans et al. (1989), “sixty six percent of [BBWO] nests were in stands with mountain pine beetle outbreaks and 34% in stands not significantly impacted by beetles.” This is simply a misrepresentation of this study and its findings. Goggans et al. (1989) did not state that these 34% of BBWO nest stands were “not significantly impacted by beetles” (see p. 31 of Goggans et al. 1989). In fact, the sampled area around each nest tree was less than one-half of an acre (see p. 9 of Goggans et al. 1989). Goggans et al. (1989) concludes that the size of BBWO territories surrounding nest trees is about “956 acres” for one pair of BBWOs (see p. 38 of Goggans et al. 1989), and makes clear that this forested landscape had extremely high tree mortality levels—about 250 beetle-killed trees per acre, as discussed in the paragraph above. The DFG Report thus misrepresents Goggans et al. (1989) by suggesting that 34% of BBWO nests were “in stands not significantly impacted by beetles.”

Fourth, the DFG Report (p. 16) cites unpublished data from Purcell (2010), which is based upon one very small area, and improperly uses it to make an inaccurate and unreliable extrapolation to the entire Sierra Nevada. The DFG Report fails to mention that, in Purcell’s data, 2 of the 8 BBWO nests found in unburned forest were from a different study, which was conducted in 1982 (Purcell, pers. comm., March 22, 2011). In Kathryn Purcell’s study, all 6 of the BBWO nests found during the 7 years of survey were in one small lodgepole pine area. For at least some of these six nests, it was very possibly the same pair of BBWOs nesting in different trees in successive years in this one tiny area of lodgepole pine surveyed (consistent with their behavior of selecting a different nest tree each year within their territory, as reported in the Petition). The DFG Report (p. 16) also fails to mention that the lodgepole pine acreage that DFG used for its extrapolation (1,012,000 acres) pertains to the entire state of California, and much of this lodgepole pine forest is in the Coast Range area and southern California—far from the BBWO’s range. Further, the DFG Report (p. 16) assumes, incorrectly, that the BBWO nests were within the 10-hectare transects in Purcell’s study. In fact, in the *nest survey* portion of the Purcell study, 40 hectares were surveyed in each of the 18 sites, including the 4 lodgepole pine sites (again, all of them in one small area) in which the BBWOs were found (Purcell, pers. comm., March 22, 2011). Also, the DFG Report’s (p. 16) improper extrapolation of Purcell’s data assumes 100% occupancy of all lodgepole pine forests by BBWO. This is unsupportable, since, even in the highest quality post-fire habitat at peak density levels, there is only about 10-25% occupancy, as discussed in the Petition (Petition, pp. 31-33). In all green forest types, including lodgepole, occupancy is much lower than this (Hutto 2008, Russell et al. 2009). Moreover, as the DFG Report (p. 16) later admits, this DFG estimate from the Purcell data uses “several unsupported assumptions,” and is therefore unreliable, while, as explained below, the estimates put forth in the Petition are based on the best available science.

For the foregoing reasons, the DFG Report’s (pp. 15-16, 19, 22) assertions about BBWOs being far more common in unburned forests than the Petition states are not based upon a single credible citation or estimate—and even the DFG Report itself admits this (see, e.g., DFG Report, p. 16 [DFG estimate based on “unsupported assumptions”] and p. 19 [Rosenberg (2004) population estimate “is not based on a robust data set and is of limited value”]). In fact, the DFG Report does not cite a single data source that it does claim to be reliable and accurate for its assertion

that “the Petition may substantially underestimate the importance of unburned forest” to California population levels of BBWOs (DFG Report, p. 15). Similarly, the DFG Report’s (p. 22) statement that “it seems likely that green forests sustain BBWO populations at relatively low, but stable levels” is contradicted by 100% of the available data sources, which show BBWOs using burned forest, or very high mortality beetle-killed forests, nearly exclusively relative to “green forests.” Nor does the DFG Report (p. 22) offer a single scientific citation to support its claim about “stable” BBWO populations in green unburned forests.

Population Size

The DFG Report (p. 18) claims that the “Petition fails to state, and the Department does not have nor did it receive, any quantitative data on the population size of BBWOs in California.” It is hard to understand how such a statement could be made, in light of the fact that the Petition (pp. 34-41) included not one but two quantitative estimates of BBWO populations in burned forests in California, and another quantitative estimate (App. F of Petition) of BBWO populations in unburned forests in California. All quantitative estimates were based upon the best existing scientific data and massive data sets—thousands and thousands of data points. Given this, it is once again hard to understand how the DFG Report (p. 19) could say this analysis was based upon “a small sample size.”

Population Trend

The DFG Report (p. 20) misleadingly states that Breeding Bird Survey (BBS) data shows no population trend for BBWO in California. However, as discussed on pages 33-34 of the Petition, BBS reports a negative population trend for BBWO in California. BBS was not able to determine whether this negative trend is statistically significant because so few BBWOs have been detected in the hundreds of survey transects conducted by BBS over many years.

Moreover, given that the BBWO is an “extreme habitat specialist” with a very close association with a particular habitat type—recent complete or near-complete tree mortality in dense, mature/old forest—its population trend can more than reasonably be estimated by habitat trend. Given that the DFG Report admits (p. 22) that the BBWO’s burned forest habitat has substantially decreased since historical times (19th century), and is likely to continue decreasing in the future due to climate change (and increased precipitation) (DFG Report, p. 23) and logging, the only reasonable inference that can be drawn—certainly the most reasonable inference—is that BBWOs have declined over the past century, and will continue to decline—at least unless habitat loss and destruction are stopped. For this reason, the DFG Report’s suggestion that the “range trend” of the BBWO has remained stable (DFG Report, p. 22) is highly misleading, since it only refers to the exterior boundaries of the range, rather than the amount and connectivity of suitable habitat within the range.

Further, the DFG Report’s (p. 20) attempt to dismiss the Petition’s discussion of qualitative and anecdotal population accounts of BBWO since the 19th century is misplaced since the Petition’s analysis of BBWO suitable habitat loss, and resulting population decline since the 19th century,

was not based upon these anecdotal accounts but, rather, upon quantitative data from empirical studies concluding that higher quality BBWO habitat has declined since the 19th century due to fire suppression and post-fire logging (Petition, pp. 46-53)—a conclusion with which the DFG Report, once again, agrees (DFG Report, p. 22). The DFG Report's (p. 21) assertion that "the Petition's characterization of a population decline is purely speculative and unsupported by any scientific data" is therefore plainly wrong given the abundant evidence presented in the Petition. The same is true of the DFG Report's (p. 22) assertion that "the relationship between trends in habitat and woodpecker population trend is unknown." There is simply no rational basis for such a statement, in light of the abundant scientific information presented in the Petition showing that the BBWO is an "extreme habitat specialist" that is found almost exclusively in older forests in which most or all of the trees have been recently killed by natural disturbance, mostly fire (Goggans et al. 1989, Hutto and Gallo 2006, Hanson 2007, Russell et al. 2007, Saab et al. 2007, Hanson and North 2008, Hutto 2008, Saab et al. 2009; see also Petition, pp. 20-54).

Post-fire Logging

The DFG Report (p. 22) cites four studies to minimize the appearance of negative impacts of post-fire logging. However, the cited studies do not support DFG's assertions, since all of them found dramatic reductions, or complete loss, of BBWO occupancy after even partial post-fire logging (i.e., even where substantial retention of larger snags occurred). In the Sierra Nevada, as discussed in the Petition, post-fire logging does not generally retain any larger snags, either on public or private lands (and the DFG Report agrees with the Petition's characterization of post-fire logging practices on public and private lands).

Please feel free to contact me if you have any questions.

Sincerely,

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Additional References Not Included in the Petition

Russell, R.E., V.A. Saab, J.J. Rotella, and J.G. Dudley. 2009. Detection probabilities of woodpecker nests in mixed conifer forests in Oregon. *The Wilson Journal of Ornithology* 121: 82-88.